Net metering, or alternatively Power Buy-Up, programs are beginning to be common in state legislation. Net metering systems allow small producers of energy to supply electricity directly into the centralized power distribution grid. These small producers are typically restricted to only renewable types of energy at a designated level of production. The producer, working with the electricity supply company, connects to the grid and in exchange receives a free power storage facility. By dumping power, as it is produced, directly onto the grid to be used immediately at another location, there is no efficiency lost in the storage of that energy in batteries. The expense of purchasing and maintaining such a storage facility can be eliminated also. Owners of distributed generation systems benefit from the reliability, quality, flexibility, sense of security, as well as the economically and environmentally soundness of these systems. "Net metering is best understood as a cost-free method for storing energy that must be consumed within a relatively short time, typically on the order of one month," says Terry Peterson, EPRI manager for solar power (Peterson 2002).

Net metering can be set up in one of two physical formats. The first consists of just one meter. This metering system is known as spinning back the meter, mainly because that is exactly what happens. You are connected to the grid, and when you draw power it turns the meter positively. Conversely, when you feed net power back to the grid the meter spins backwards, or negatively. The other system in existence is a two meter system. There is one meter which solely reads the power that location is using from the grid, while the second meter reads the amount of power that has been fed into the system.

These two metering schemes are usually directly related to the type of compensatory program the state or utilities within that state have set up. The systems using the spin back, or single meter system, are generally giving an equal exchange of power units. There would be no calculable difference in billing rates for this exchange. The systems using the two meters are usually set up to benefit the commercial power supply utility. These will generally charge at the retail rate for the power used from the grid, while giving a wholesale price to the power that was uploaded to the system. This indicates that if the customer used exactly as much power as they produced that they would still need to pay the utility for the difference in rates. Any excess power produced in addition to the crediting system is not guaranteed to be paid for by the utility. Utilities may or may not need to pay for the excess power which they have received from the small producers. Some will pay full retail price to the producer even in excess of an even exchange, although other utilities will provide no compensation for power received (US DOE 2003).

It is important to point out that each state has its own net metering regulations and format, if there is any system at all in that state. The Vermont system will be highlighted to describe a typical state regulatory setup. The first legislature detailing net metering within the state of Vermont was initiated on April 22, 1998. At this time the state required that commercial suppliers of electricity be required to credit small net producers of electricity. The systems qualifying for this program include Photovoltaic solar, fuel cell, and biomass gasification systems producing 15 kW or less. A more Vermont specific inclusion to this qualification list is what is called the Farm System. This Farm System is an anaerobic digester processing animal wastes into gases used to produce

electricity. These systems are allowed to produce up to 150 kW of power. The limiting factor is that each of the power supply companies is only allowed to hook up subscribers of this program to a total generating capacity of 1% of the companies peak demand as it was during 1996 year. The subscribers to this program must all conform to the standards set up by both the National Electric Code and the Institute of Electrical and Electronics Engineers (Perchlick 2003).

The Vermont system is set up similarly to other state's net metering systems. The main differences between these programs are not very varied. There are differences in the types and sizes of systems qualifying for the program, the total generation allowed statewide, and most of all the treatment of the buyback itself. A summary table has been included in the Appendix of this report which details the main differences of the states which do have these systems implemented. There is also an accompanying map of the United States showing which states participate in some form of net metering program and the level of power that this program makes up within that state. This information is current of June 2003, as found at The Green Power Network website, managed by the US Department of Energy.

There has been nothing to this point passed at the federal level of regulation, although a bill has been introduced. On September 24, 1999 Congressman Jay Inslee (D-WA) introduced a bill entitled "Home Energy Generation Act" (HR 2947). This bill proposes a national standard for net metering. The national system will qualify systems including fuel cell, wind, solar, or biomass that are 100 kW or less. The total generating capacity of systems falling within this program will be 2% of peak demand, with no more than 1% dedicated to any one source type. The electricity added to the network by the

small producers will be credited beyond the current billing cycle and continue to be valid for the ensuing year after production. If this energy credit is still a positive net amount at the end of that year period any distribution company which wants to purchase it can at wholesale cost. If there are no power companies wanting to purchase that extra power, then the Local Distribution Company gets assigned that power without having to pay the producer. Written into the legislation is a regulation ensuring that commercial supply companies do not impose any other fees upon customers involved in this program. Also detailed in this legislation is that the Federal Energy Regulatory Commission needs to pass regulations pertaining to the physical connections to the systems within one year of this bill passing (Inslee, Jay(D-WA) 1999).

At this point in time there are not as many people joining this program as there is capacity available. David Grover with the VT Department of Public Service has commented on why he believes there is a lack of participation in this program. He believes that this program is such a new program that there has not been enough time for the general public to catch on to its benefits. Over time with education to the masses this program could blossom to meet the current limiting capacity that the states have set up at this point in time. The other drawback to this program is that there is currently an abundance of cheap oil available to the public. There are also many misconceptions in the public's view of renewable energy and the pros and cons associated with this type of power production. Other drawbacks which have inhibited the program are the generally high cost and extensive permitting that wind power generation stations need to go through to be allowed to go online. Especially in VT a major drawback is the price of the mandatory Certificate of Public Good issued by the Public Service Board. This is the

same certification that a commercial producer must purchase and the $10,000 fee is very steep for the small producer in question (Forsynth et al. 2002).

It has been documented that perceived supply and demand is a critical component in determining the level of participation of these programs. California has the largest number of customers, as well as the longest running program of state incentives. The buy down program was greatly affected by the sudden power shortages and power price increases within the state of California in 2000 and 2001. November 2002, there were 1416 metered customers with 994 pending, while as of January 2001 there were only 170 participants. This sudden increase in net metering sites has been investigated thoroughly and is determined to be due to the perceived power crisis and the need for individuals to be able to provide for their own power needs (Forsynth et al. 2002).

This net metering system discussed is strongly related to a distributed power generation system. By allowing small producers of energy to join together as part of the central energy distribution network it is in essence decentralizing a small part of the larger system. This decentralization is something that can in the long run make our system more stable and less dependent on larger utilities to determine the price of energy. As more and more small producers continue to join the power grid the system could in time and with a supreme organizational body become independent of large fossil fuel based sources of energy. This step to removing fossil fuels as our main source of electricity would be one of the last steps needed to completely bring the United States to a point of energy independence from foreign sources. This independence started with a few net metering programs will become necessary for any world power to secure their domestic power.

Summary of State Net Metering Programs

This Table was last updated on 6/3/03

State	Allowable Technology and Size	Allowable Customer	Statewide Limit	Treatment of Net Excess Generation (NEG)	Authority	Enacted	Scope of Program	Citation/Reference
Arizona	Renewables and cogeneration ≤100 kW	All customer classes	None	NEG purchased at avoided cost	Arizona Corporation Commission	1981	All IOUs and RECs	PUC Order Decision 52345, Docket 81-045
Arkansas	Renewables, fuel cells and microturbines ≤25 kW residential ≤100 kW commercial	All customer classes	None	Monthly NEG granted to utilities	Legislature	2001	All utilities	HB 2325, effective Oct. 2001; PSC Order No. 3 July 3, 2002
California	Solar and wind ≤1000 kW	All customer classes	0.5% of utilities peak demand	Annual NEG granted to utilities	Legislature	2002; 2001; 1995	All utilities	Public Utilities Codes Sec. 2827 (amended 09/02; 04/01; effective 9/98)
Colorado	Wind and PV 3 kW, 10 kW	Varies	NA	Varies	Utility tariffs	1997	Four Colorado utilities	PSCO Advice Letter 1265; PUC Decision C96-901 [1]
Connecticut	Renewables and fuel cells ≤100 kW	Residential	None	Not specified	Legislature	1990, updated 1998	All IOUs, No REC in state.	CGS 16-243H; Public Act 98-28
Delaware	Renewables ≤25 kW	All customer classes	None	Not specified	Legislature	1999	All utilities	Senate Amendment No. 1 to HB 10
Georgia	Solar, wind, fuel cells ≤10 kW residential ≤100 kW commercial	Residential and commercial	0.2% of annual peak demand	Monthly NEG or total generation purchased at avoided cost or higher rate if green priced	Legislature	2001	All utilities	SB93
Hawaii	Solar, wind, biomass, hydro ≤10 kW	Residential and small commercial	0.5% of annual peak demand	Monthly NEG granted to utilities	Legislature	2001	All utilities	HB 173
Idaho	All technologies ≤100 kW	Residential and small commercial (Idaho Power only)	None	Monthly NEG purchased at avoided cost	Public Utility Commission	1980	IOUs only, RECs are not rate-regulated	Idaho PUC Order #16025 and #26750 (1997) Tariff sheets 86-1 thru 86-7
Illinois	Solar and wind ≤40 kW	All customer classes; ComEd only	0.1% of annual peak demand	NEG purchased at avoided cost	ComEd tariff	2000	Commonwealth Edison	Special billing experiment [1]
Indiana	Renewables and cogeneration ≤1,000 kWh/month	All customer classes	None	Monthly NEG granted to utilities	Public Utility Commission	1985	IOUs only, RECs are not rate-regulated	Indiana Administrative Code 4-4.1-7
Iowa	Renewables and cogeneration (No limit per system)	All customer classes	105 MW	Monthly NEG purchased at avoided cost	Iowa Utility Board	1993	IOUs only, RECs are not rate-regulated[2]	Iowa Administrative Code [199] Chapter 15.11(5)
Maine	Renewables and fuel	All customer	None	Annual NEG granted to	Public Utility	1998	All utilities	Order # 98-621

	cells ≤100 kW	classes		utilities	Commission			RC of ME Chapter 36
Maryland	Solar only ≤80 kW	Residential and schools only	0.2% of 1998 peak	Monthly NEG granted to utilities	Legislature	1997	All utilities	Article 78, Section 54M
Massachusetts	Qualifying facilities ≤60 kW	All customer classes	None	Monthly NEG purchased at avoided cost	Legislature	1997	All utilities	Mass. Gen. L. ch. 164, §1G(g); Dept. of Tel. and Energy 97-111
Minnesota	Qualifying facilities ≤40 kW	All customer classes	None	NEG purchased at utility average retail energy rate	Legislature	1983	All utilities	Minn. Stat. §216B.164
Montana	Solar, wind and hydro ≤50 kW	All customer classes	None	Annual NEG granted to utilities at the end of each calendar year.	Legislature	1999	IOUs only	SB 409
Nevada	Solar and Wind ≤10 kW	All customer classes	None	Monthly or annual NEG granted to utilities	Legislature	2001; 1997	All utilities	Nevada Revised Statute Ch. 704; amended AB661 (2001)
New Hampshire	Solar, wind and hydro ≤25 kW	All customers classes	0.05% of utility's annual peak	NEG credited to next month	Legislature	1998	All utilities	RSA 362-A:2 (HB 485)
New Jersey	PV and wind ≤100 kW	Residential and small commercial	0.1% of peak or $2M annual financial impact	Annualized NEG purchased at avoided cost	Legislature	1999	All utilities	AB 16. Electric Discount and Energy Competition Act
New Mexico	Renewables and cogeneration ≤10 kW	All customer classes	None	NEG credited to next month, or monthly NEG purchased at avoided cost (utility choice)	Public Utility Commission	1999	All utilities	NMPUC Rule 571, 17 NMAC 10.571
New York	Solar only residential ≤10 kW; Farm biogas systems <400 kW	Residential; farm systems	0.1% 1996 peak demand	Annualized NEG purchased at avoided cost	Legislature	2002; 1997	All utilities	Laws of New York, 1997, Chapter 399; amended SB 6592 (2002)
North Dakota	Renewables and cogeneration ≤100 kW	All customer classes	None	Monthly NEG purchased at avoided cost	Public Utility Commission	1991	IOUs only, RECs are not rate-regulated	North Dakota Admin. Code §69-09-07-09
Ohio	Renewables, microturbines, and fuel cells (no limit per system)	All customer classes	1.0% of aggregate customer demand	NEG credited to next month	Legislature	1999	All utilities	S.B. 3 (effective 01/01/01)
Oklahoma	Renewables and cogeneration ≤100 kW and ≤25,000 kWh/year	All customer classes	None	Monthly NEG granted to utility	Oklahoma Corporation Commission	1988	All utilities	OCC Order 326195
Oregon	Solar, wind, fuel cell and hydro ≤25 kW	All customer classes	0.5% of peak demand	Annual NEG granted to low-income programs, credited to customer, or other use determined by Commission	Legislature	1999	All utilities	H.B. 3219 (effective 9/1/99)
Pennsylvania	Renewables and fuel cells ≤10 kW	Residential	None	Monthly NEG granted to utility	Legislature	1998	All utilities	52 PA Code 57.34

Rhode Island	Renewables and fuel cells ≤25 kW	All customer classes	1 MW for Narragansett Electric Company	Annual NEG granted to utilities	Public Utility Commission	1998	Narragansett Electric Company	PUC Order Docket 2710
Texas	Renewables only ≤50 kW	All customer classes	None	Monthly NEG purchased at avoided cost	Public Utility Commission	1986	All IOUs and RECs	PUC of Texas, Substantive Rules, §23.66(f)(4)
Vermont	PV, wind, fuel cells ≤15 kW Farm biogas ≤150 kW	Residential, commercial and agricultural	1% of 1996 peak	Annual NEG granted to utilities	Legislature	1998	All utilities	Sec. 2. 30 V.S.A. §219a; amended Senate Bill 138, 2002
Virginia	Solar, wind and hydro Residential ≤10 kW Non-residential ≤25 kW	All customer classes	0.1% of peak of previous year	Annual NEG granted to utilities (power purchase agreement is allowed)	Legislature	1999	All utilities	Virginia Assembly S1269 Approved by both Assembly and Senate 3/15/99
Washington	Solar, wind, fuel cells and hydro ≤25 kW	All customer classes	0.1% of 1996 peak demand	Annual NEG granted to utility	Legislature	1998	All utilities	Title 80 RCW House Bill B2773
Wisconsin	All technologies ≤20 kW	All retail customers	None	Monthly NEG purchased at retail rate for renewables, avoided cost for non-renewables	Public Service Commission	1993	IOUs only, RECs are not rate-regulated	PSCW Order 6690-UR-107
Wyoming	Solar, wind and hydro ≤ 25 kW	All customer classes	None	Annual NEG purchased at avoided cost	Legislature	2001	All IOUs and RECs	HB 195, Feb. 2001

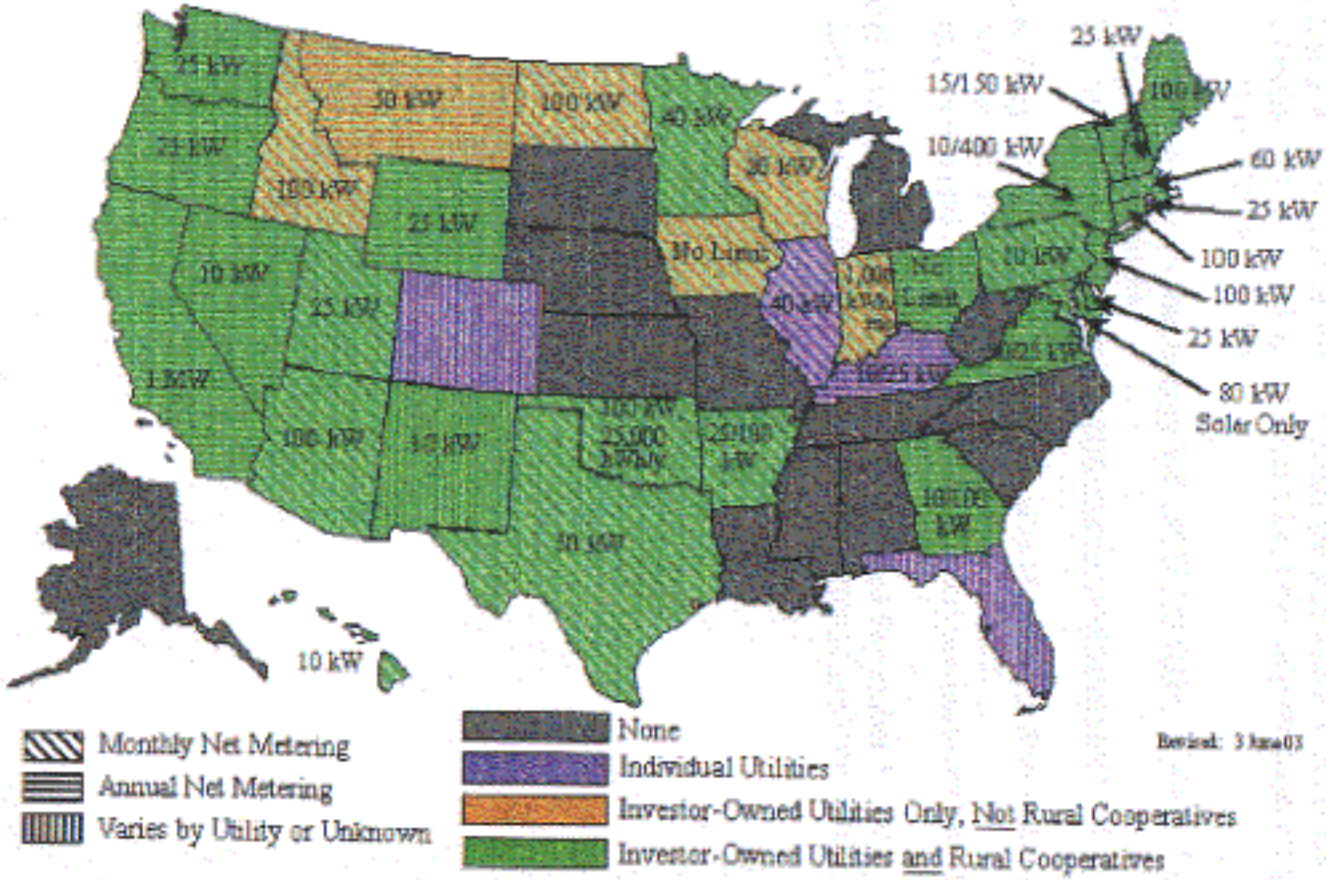
Notes:

IOU — Investor-owned utility
GandT — Generation and transmission cooperatives
REC — Rural electric cooperative

[1] For information, see the Database of Statet Incentive for Renewable Energy (http://www.dcs.ncsu.edu/solar/dsire/dsire.cfm).
[2] Except for the Linn County Electric Cooperative, which is rate-regulated by Iowa PUC.

The original format for this table is taken from: Thomas J. Starrs (September 1996). *Net Metering: New Opportunities for Home Power.* Renewable Energy Policy Project, Issue Brief, No. 2. College Park, MD: University of Maryland

Net Metering By State



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